Fast trading & prop trading

Bruno Biais, Fany Declerck, Sophie Moinas

Toulouse School of Economics

FBF IDEI Chair on Investment Banking and Financial Markets

Very, very, very preliminary!

Comments and leniency welcome!

Paris, April 2013

Issues

Do financial markets fulfill their mission: price discovery, risk-sharing, allocative efficiency?

Matters for welfare: corporate financing, savings

Necessary condition: adequate liquidity must be provided

Potential problem: asymmetric information => adverse selection => gains from trade can't be reaped

To ensure adequate liquidity supply & mitigate adverse selection, how should markets be organized?

Which types of trading should be encouraged, or regulated?

Focus of this paper

Which orders and traders are informed … generating adverse selection costs for others?

Which are profitable?

Are fast traders more informed? More profitable?

Are limit or market orders more informed? More profitable?

Another important characteristic of traders is whether they act on their own account (prop trading) or on behalf of customers (brokers).

Does this affect informativeness, profitability?

What's the relative magnitude of the different effects?

Literature

- Baron, Brogaard, Kirilenko (2012): E-mini S&P 500 futures
  - Fast market orders earn profits
  - From opportunistic traders (0.5 bp), fundamental traders (0.25 bp), small traders (1 bp)
- Brogaard, Hendershott, Riordan (2012): Nasdaq
  - Fast market orders are informed – since they are in the direction of (short horizon) price changes
  - Fast limit orders bear adverse selection costs

Data

Data from Euronext and AMF: thanks a lot to them both ☺ !!

Orders and trades: including member ID

Account: client, prop trader/designated market makers, "related party"

Colocation

Throughput: max number of messages per second

Sample of stocks

131 stocks traded in Euronext Paris

Dropped: 9 with stocks splits, SEO, … 5 with very few trades

Sub-sample: 20 stocks *(pilot: 30, not there yet… takes time)*

      large cap & financial: 1 stock *(3 stocks)*
      large cap & non-financial: 6 stocks *(14 stocks)*
      mid cap & financial: 1 stock *(1 stock)*
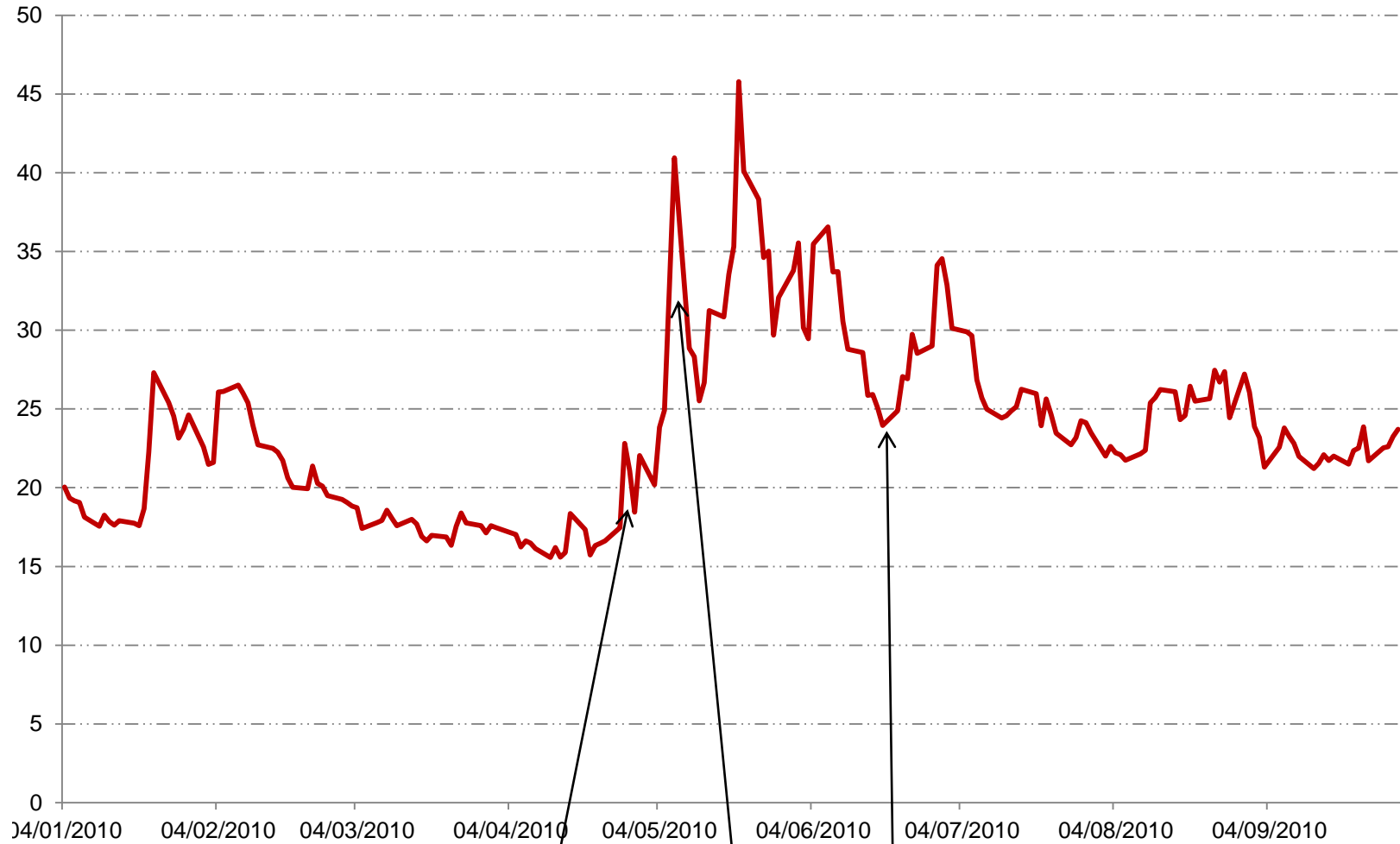   mid cap & non-financial: 8 stocks *(8 stocks)*
      small cap & non-financial: 4 stocks *(4 stocks)*

Other stocks = hold-out sample

Sample period (Jan 1, Sept 30, 2010)

VIX

April 23: Greece
asks for bailout

May 7:
bailout

June 14:
downgrade

7

Agency trading vs prop trading

28 members are "Principal": 100% trades = pure prop trading or liquidity supply
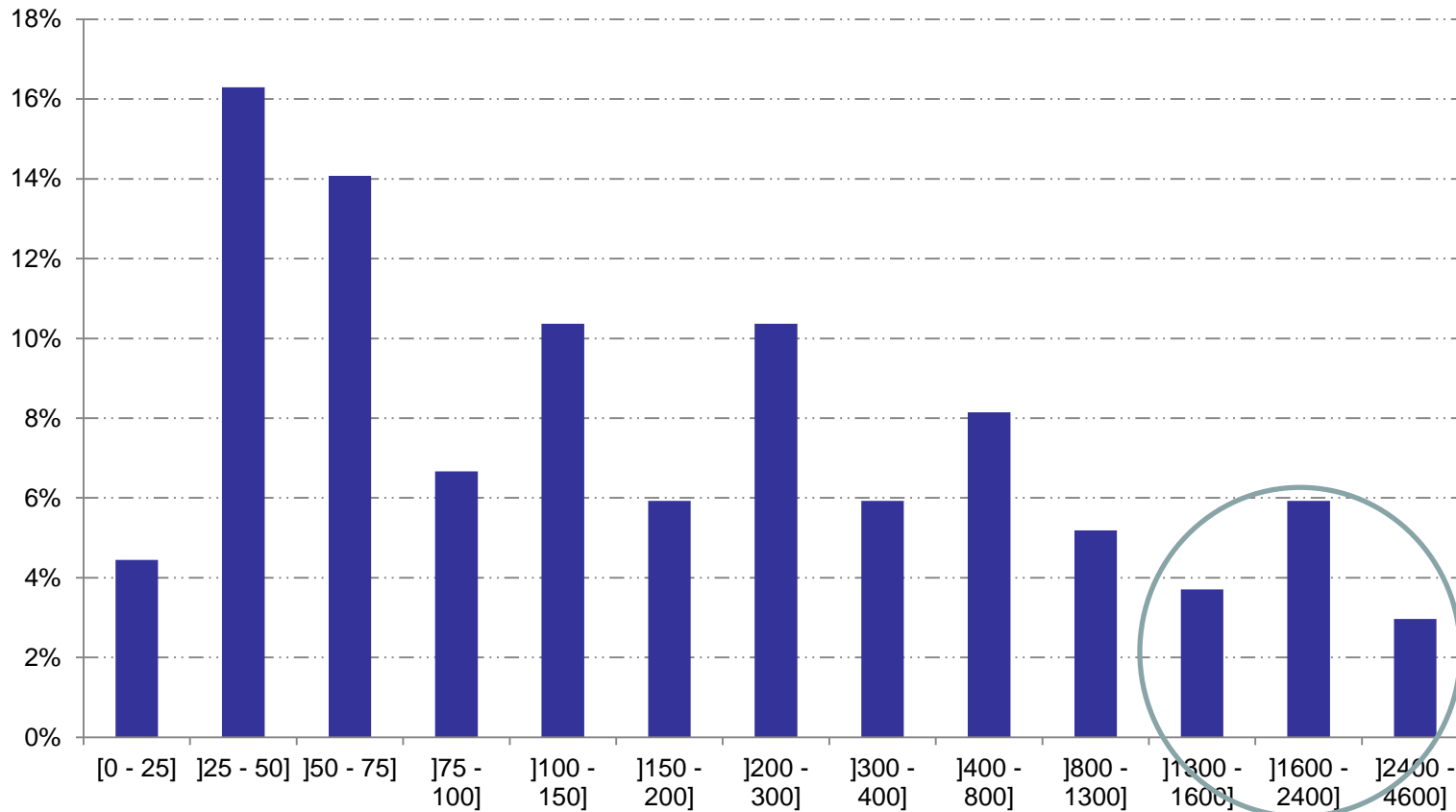
55 members are pure "Broker": 100% trades = client

52 "Others": both prop trading & order placement for clients
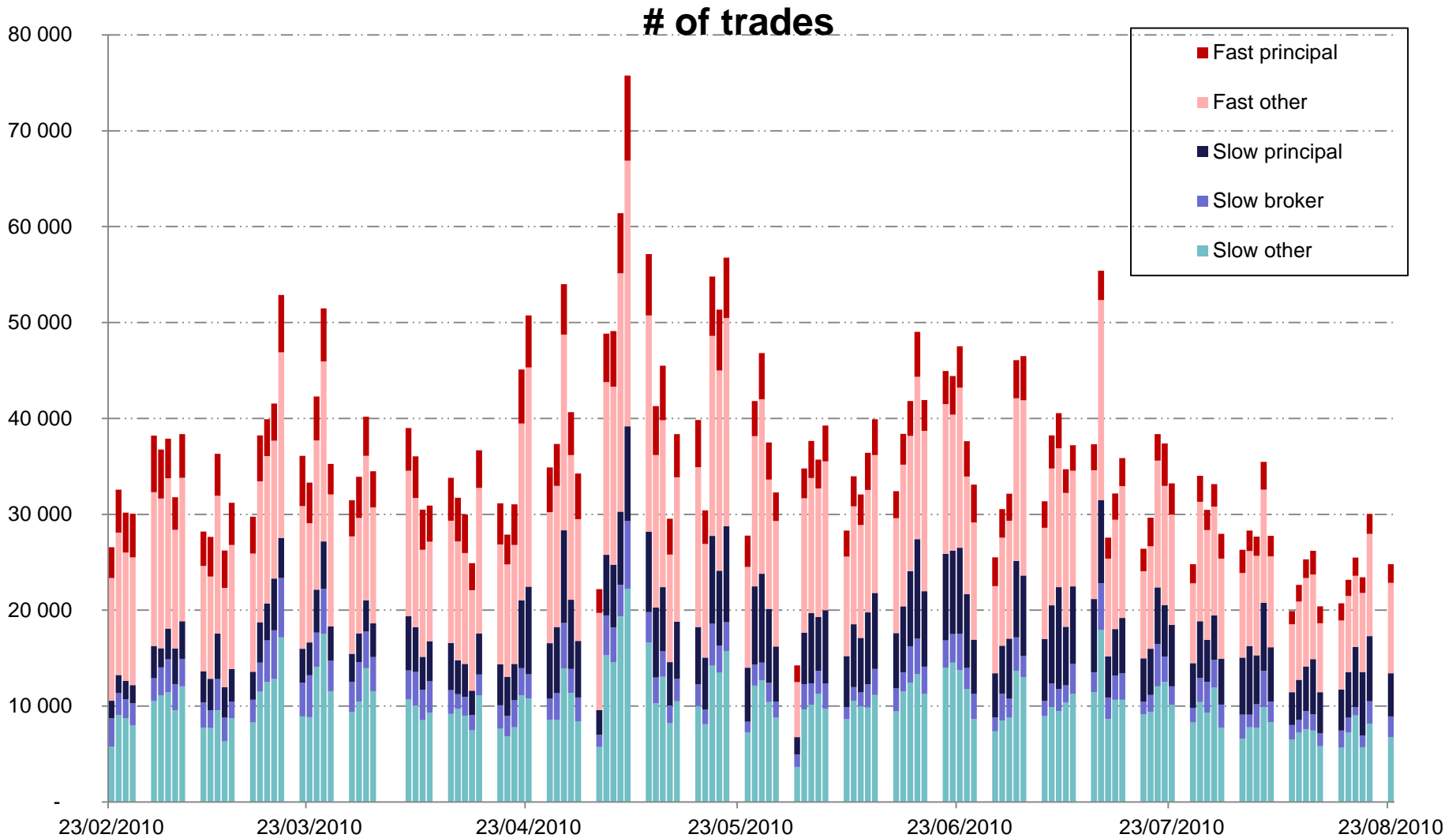
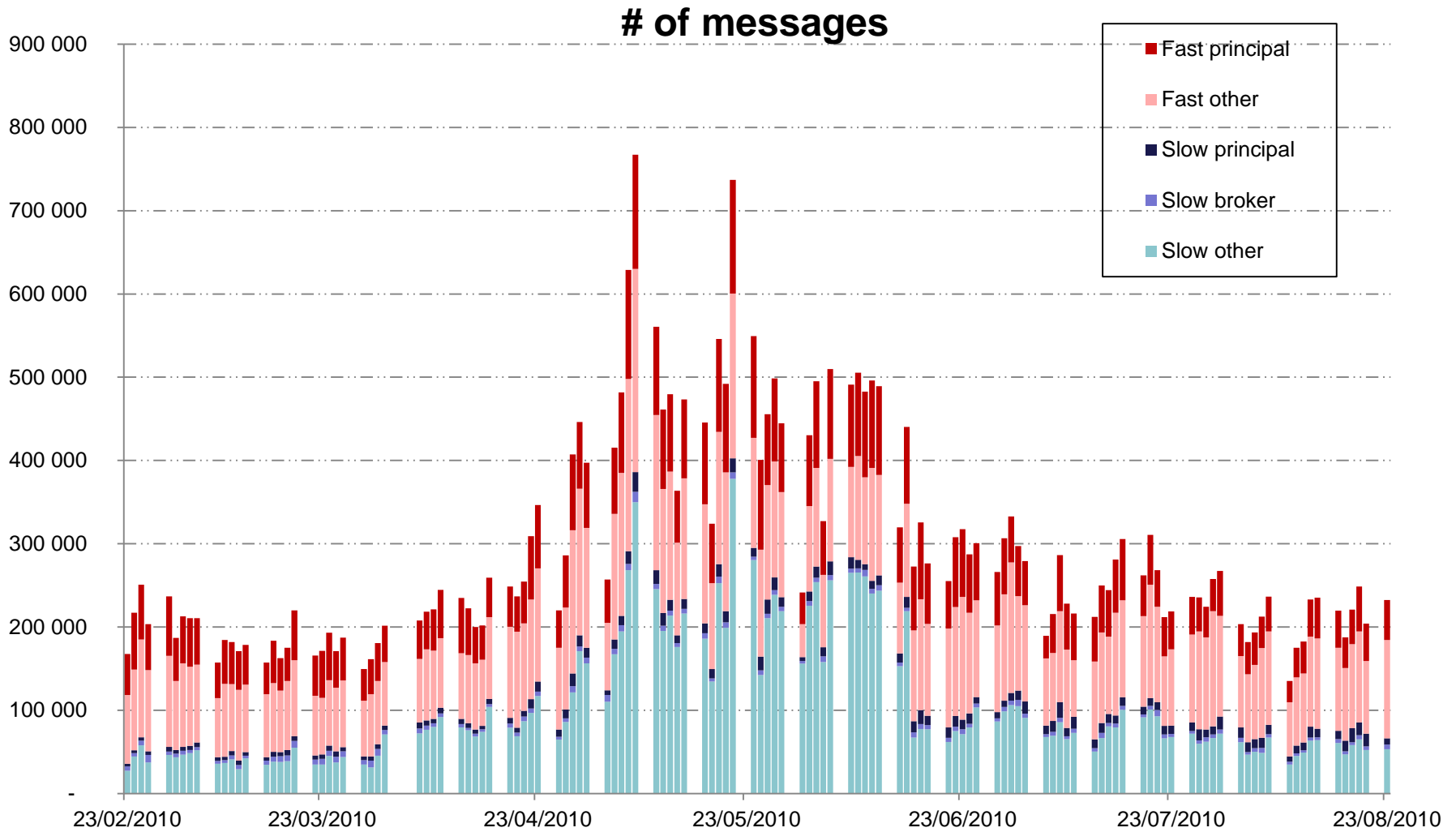# Speed

% of members

Max # messages per second

« fast » = 17 members with capacity > 1300 mssg/sec
(we'll do robustness checks)

5 types of players

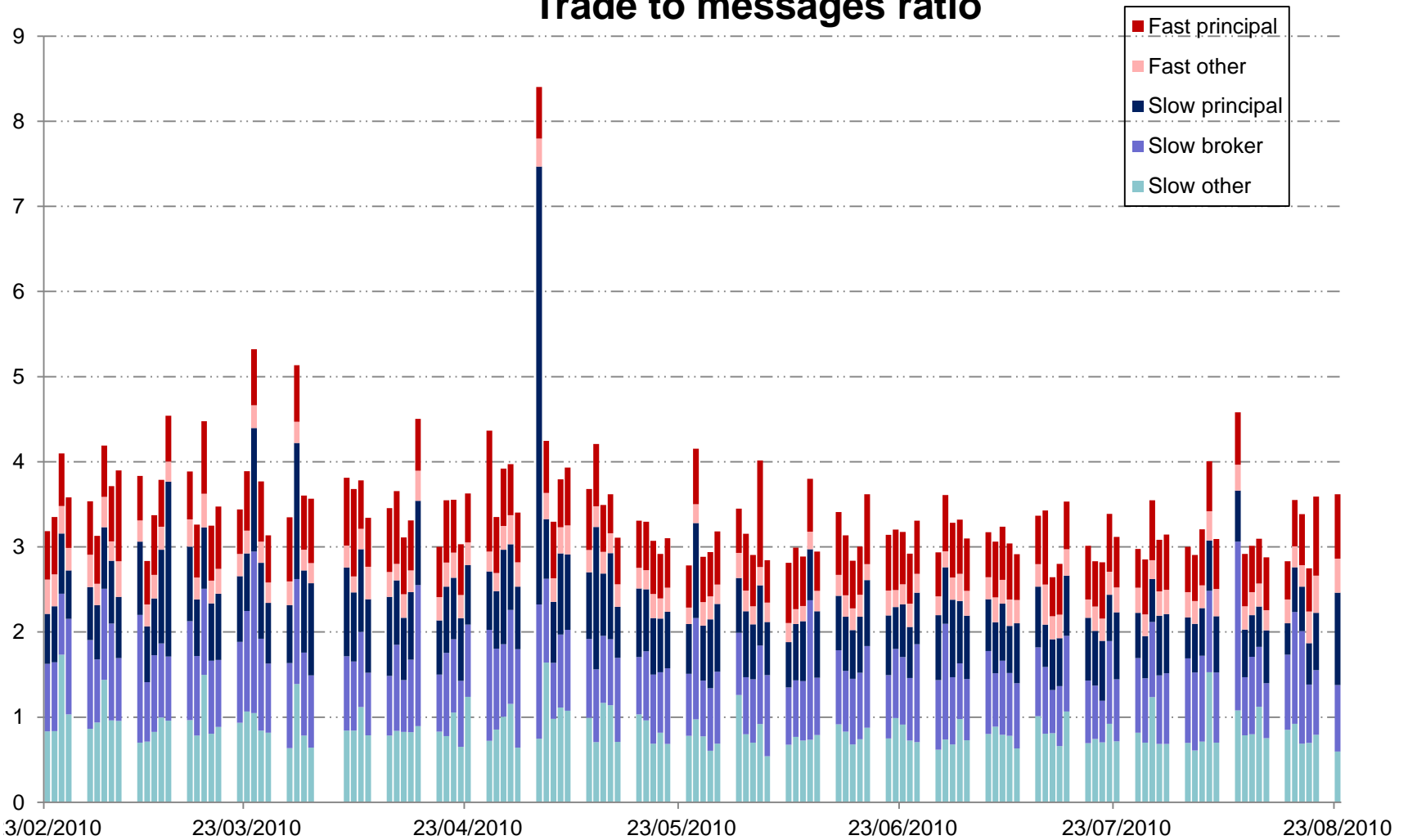|	Fast (>1300 mssg/sec)	Slow (< 1300 mssg/sec)
Principal (100% trades as principal)	6	22
Others	11	41
Broker (0% trades as principal)	0	55

# of trades

Legend:
- Fast principal
- Fast other
- Slow principal
- Slow broker
- Slow other

Fast = around 50% of trades (17 members out of 135)
Crisis => more trades (but no increase in % fast)

11

# of messages

Legend:
- Fast principal
- Fast other
- Slow principal
- Slow broker
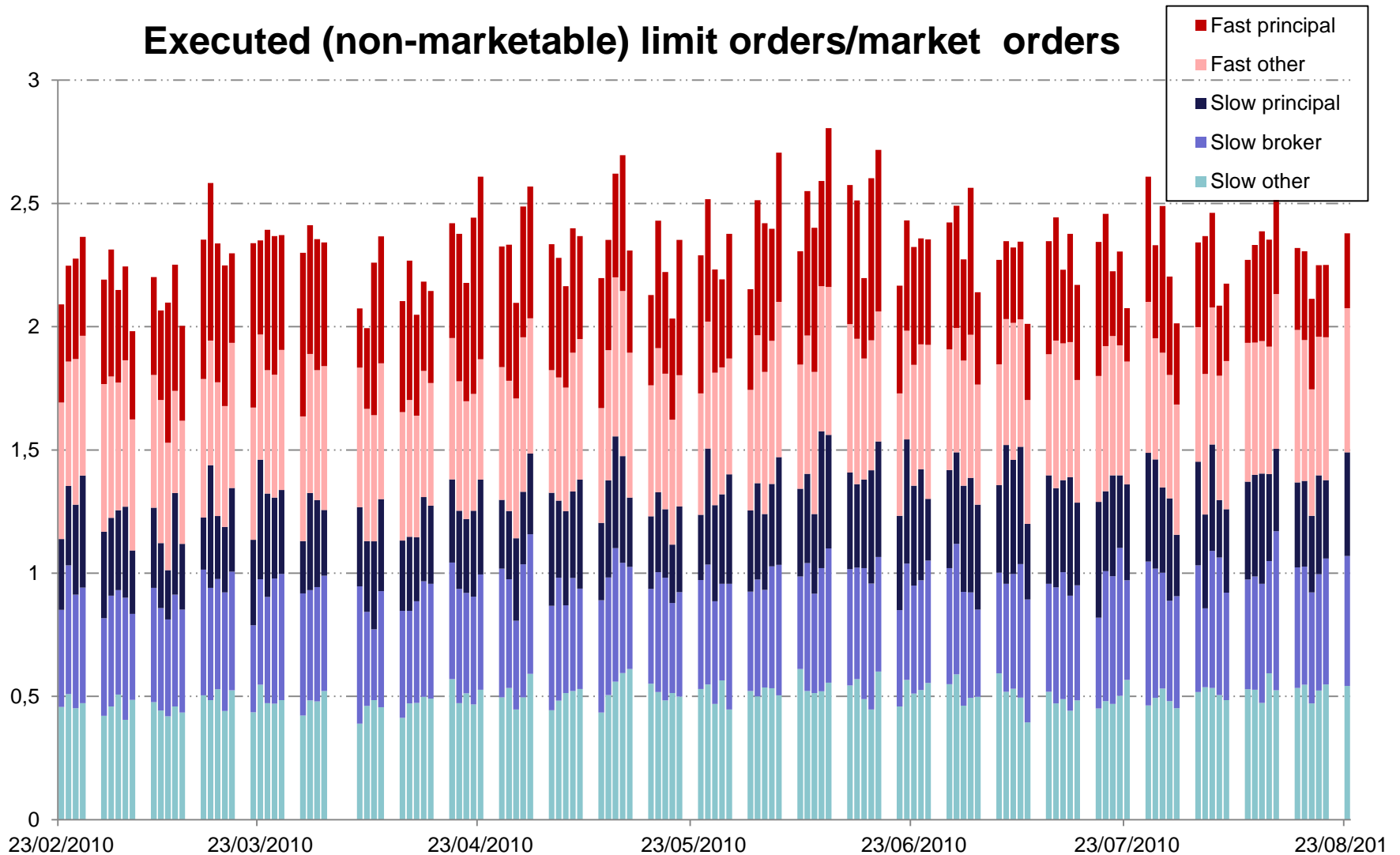- Slow other

17 fast members > ½ messages
Increased volat => more messages (**slow** & fast)

Trade to messages ratio
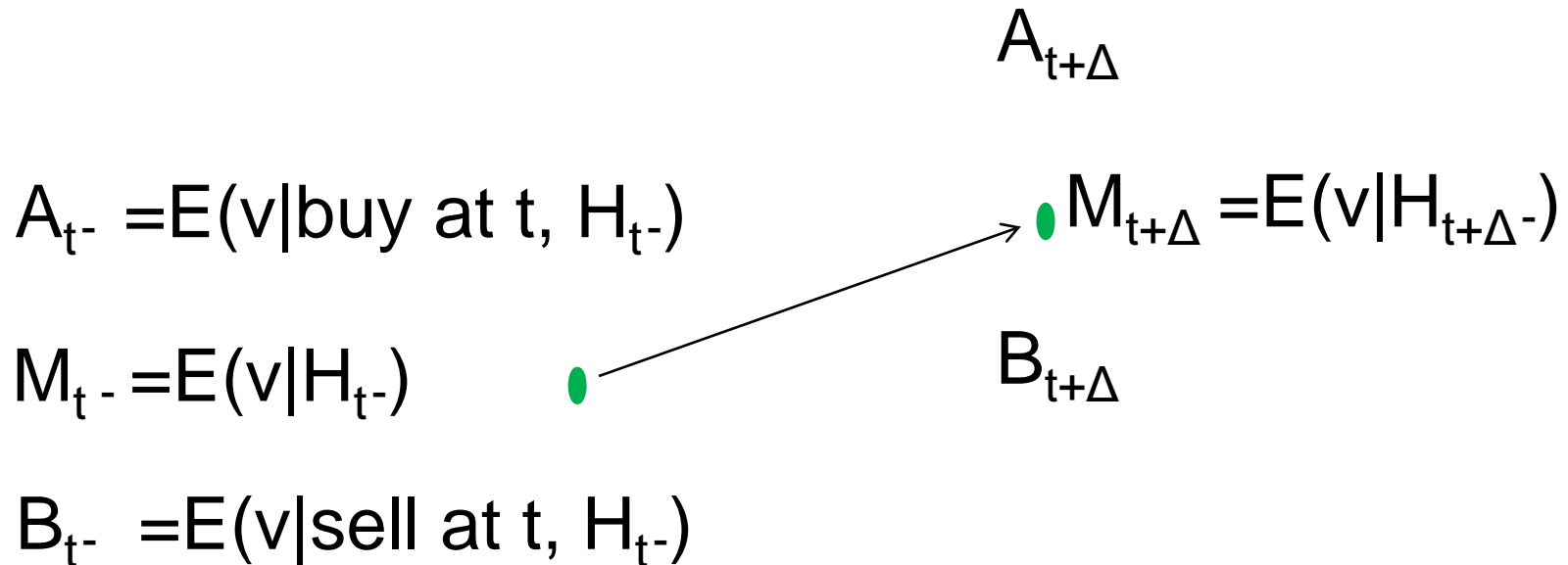
Principals & fast have smaller trade to message ratio

Executed (non-marketable) limit orders/market orders

Legend:
- Fast principal
- Fast other
- Slow principal
- Slow broker
- Slow other

Most aggressive = prop traders
Fast not more aggressive than slow
Stable through sample period

14

Information content of trades

Increase (resp. decrease) in midquote (resp. decreases) after market order to buy (resp. sell)

$$A_{t+\Delta}$$

$$A_{t-} = E(v|\text{buy at } t, H_{t-}) \qquad M_{t+\Delta} = E(v|H_{t+\Delta-})$$

$$M_{t-} = E(v|H_{t-}) \qquad\qquad B_{t+\Delta}$$

$$B_{t-} = E(v|\text{sell at } t, H_{t-})$$

Which types of players have more info (trades with large info content)? Fast ? Slow? Principal?

At what horizon? 1 second? 1 minute? 1 hour?

15

Measuring info content of trades

$(M_{t+\Delta} - M_{t-})$*sign of market order (>0 if market order to buy)

Empirical average for 5 different categories of MO traders

Regression on dummy for type of trade + control variables: depth, spread, lagged volume-volatility-messg/trade, dummy for the previous trade, life time, day-stock-time of day fixed effects
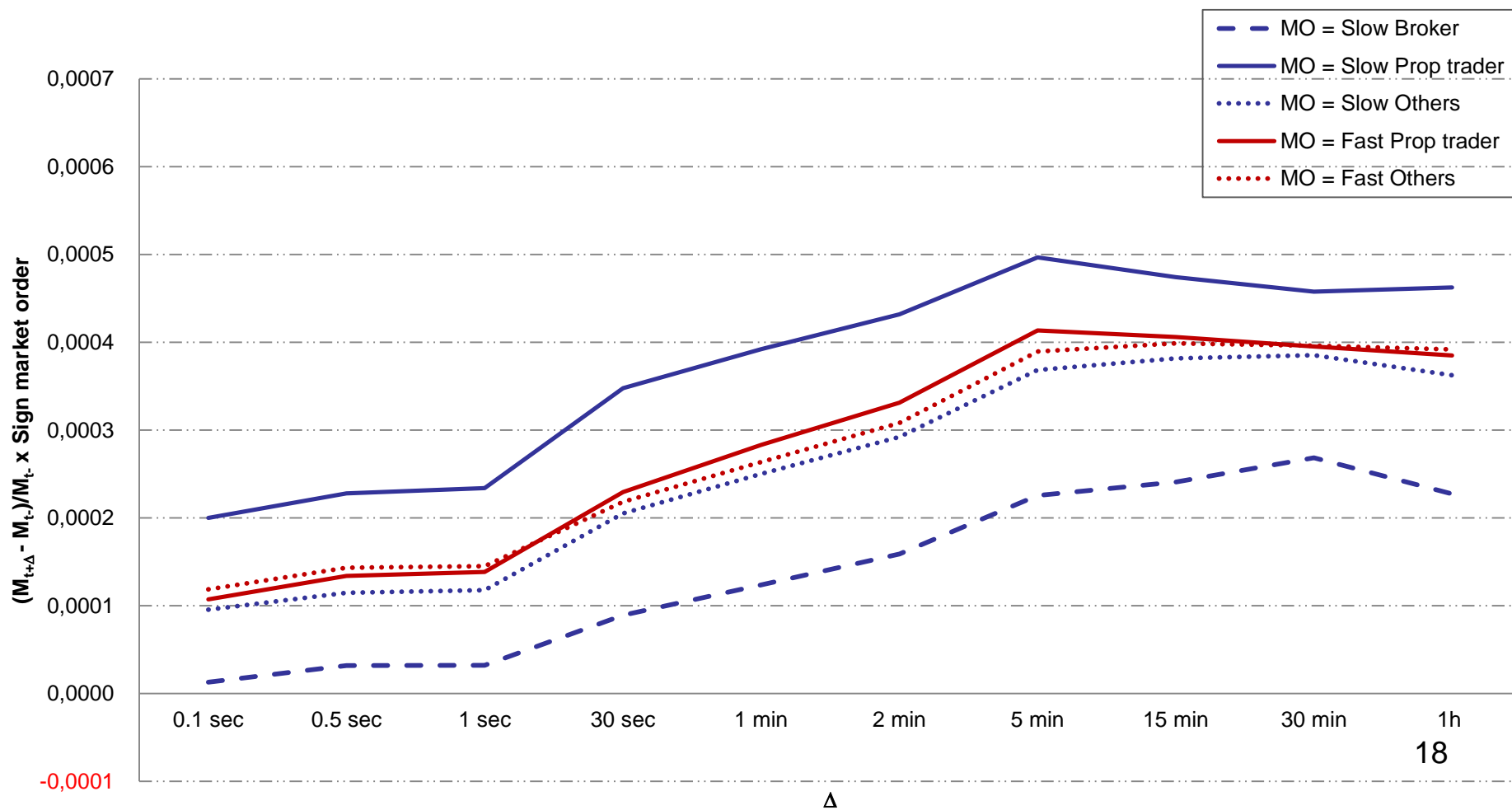
Qualitatively similar results in both approaches

Info impounded in price after 2 to 5 minutes
Slow prop most informed (> 6bp)
Slow brokers least informed (< 4bp)
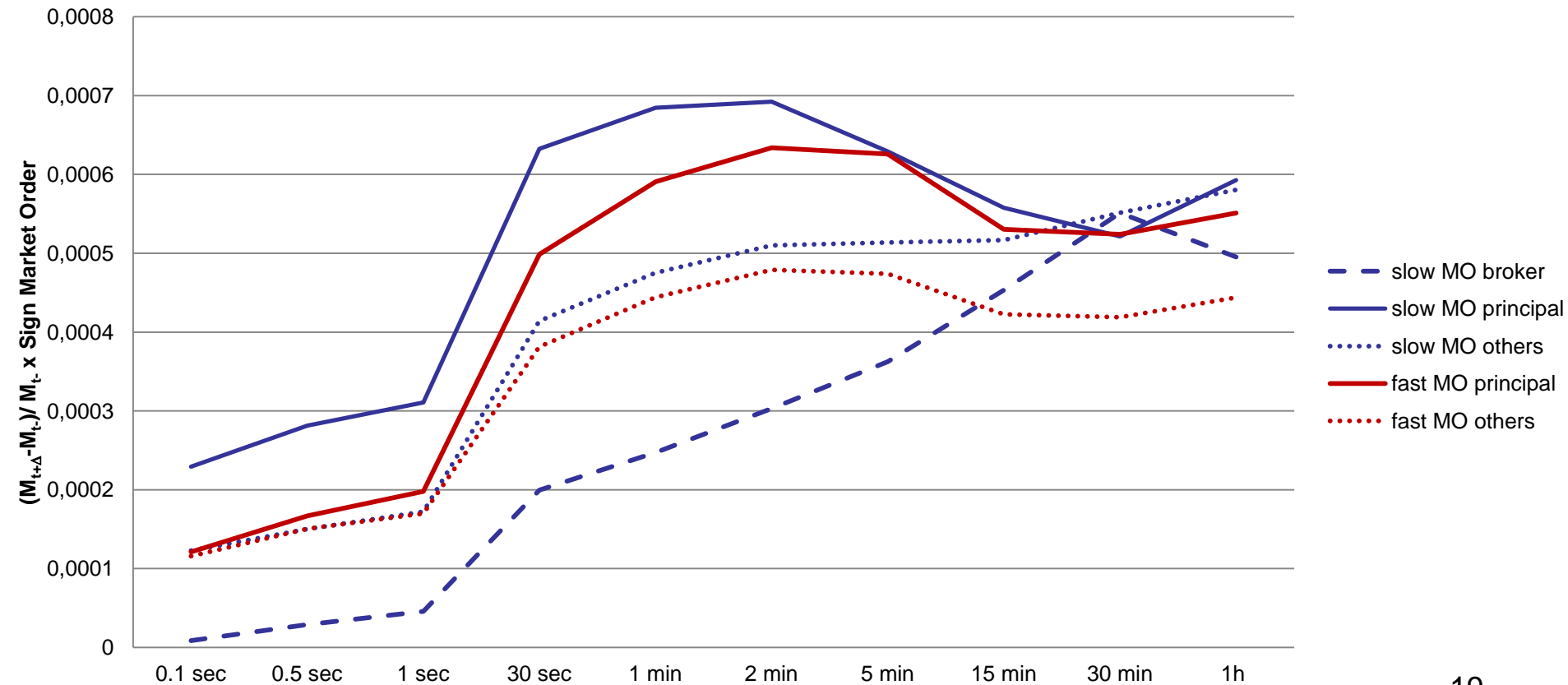# Fast traders in between (5 bp)

Empirical average, whole sample
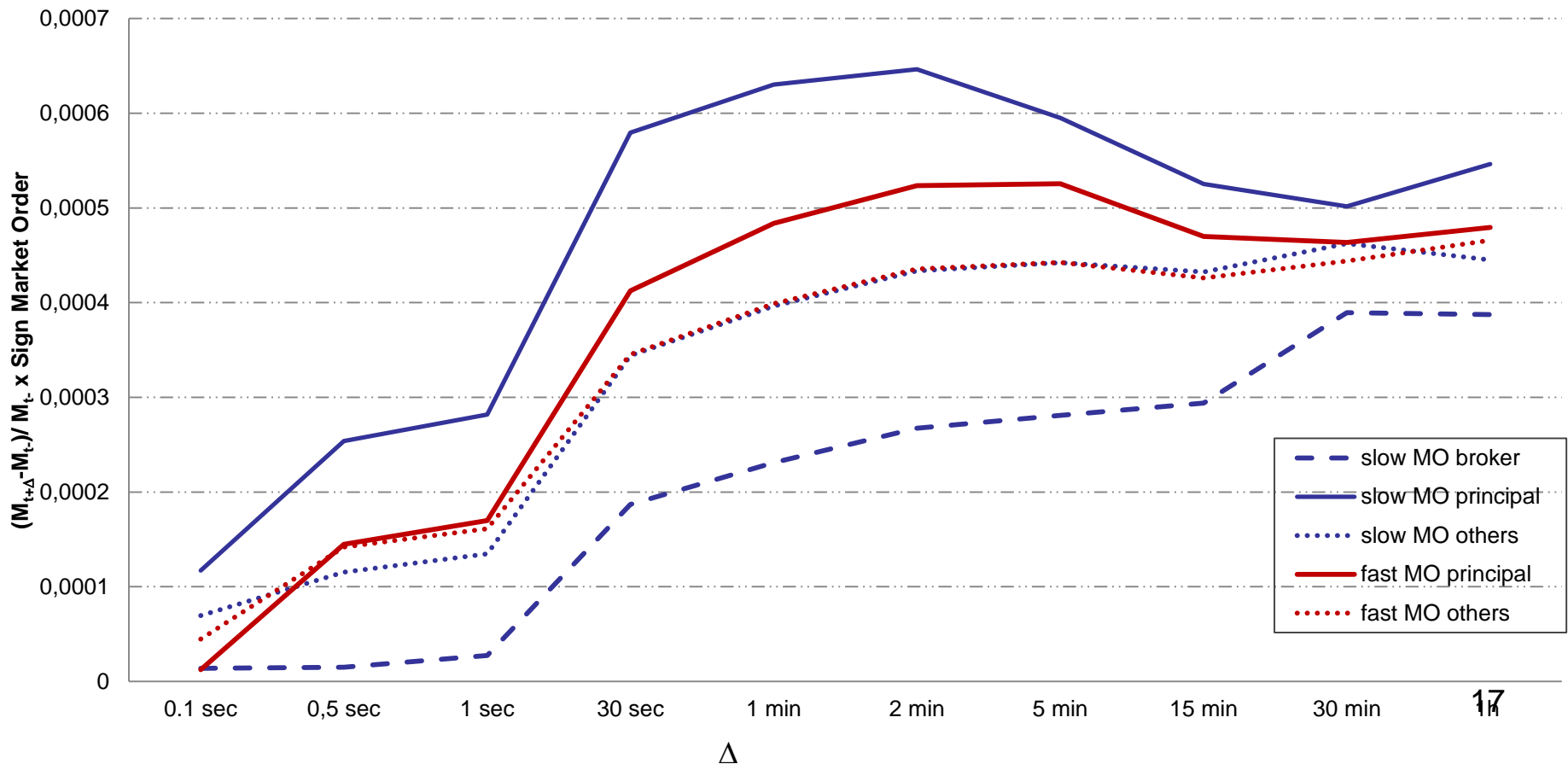
Results qualitatively similar
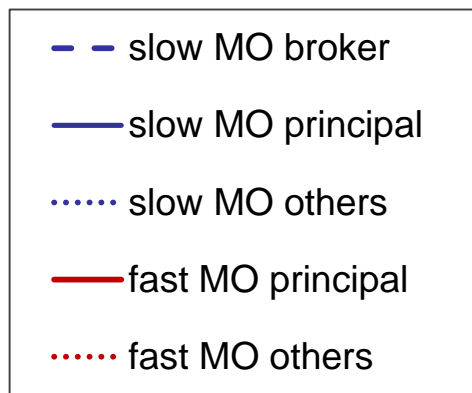# with regression approach (all dummies significant)

Regression, whole sample
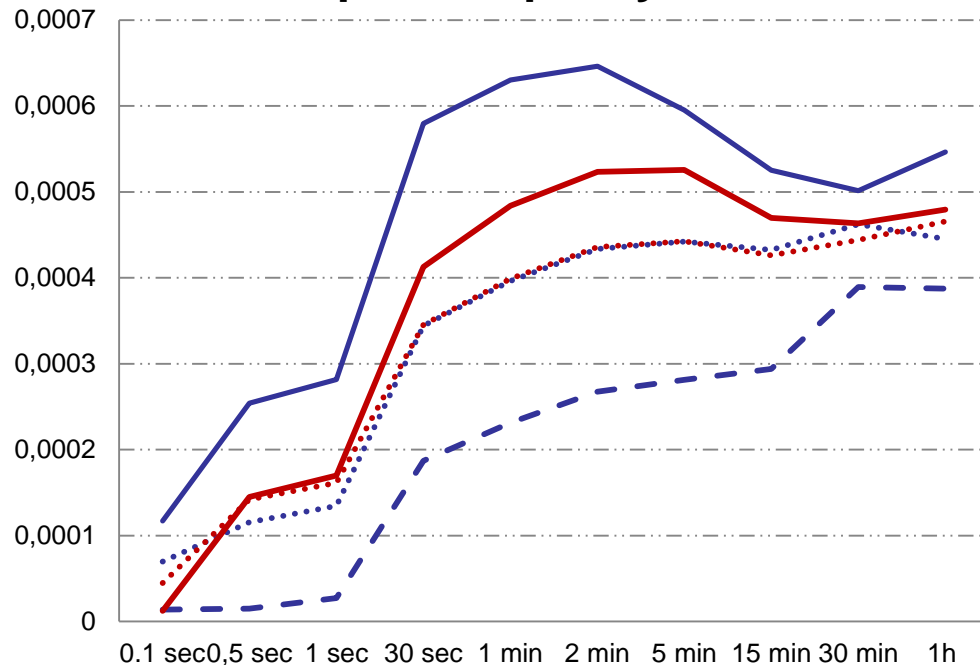

18

Midst of Crisis:
Larger info content/adverse selection
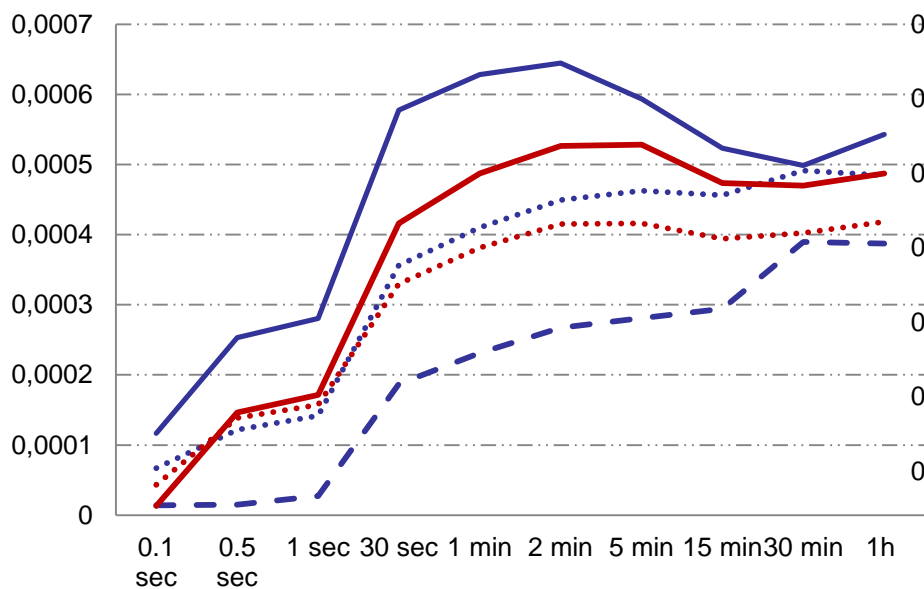
Empirical average, May June 2010

Legend:
- slow MO broker (dashed blue)
- slow MO principal (solid blue)
- slow MO others (dotted blue)
- fast MO principal (solid red)
- fast MO others (dotted red)

y-axis: $(M_{t+\Delta} - M_{t-})/M_{t-} \times$ Sign Market Order

x-axis: 0.1 sec, 0.5 sec, 1 sec, 30 sec, 1 min, 2 min, 5 min, 15 min, 30 min, 1h

Information content of MO
$(M_{t+\Delta} - M_{t-})/M_{t-}$ x Sign market order
Empirical average

Legend:
- slow MO broker
- slow MO principal
- slow MO others
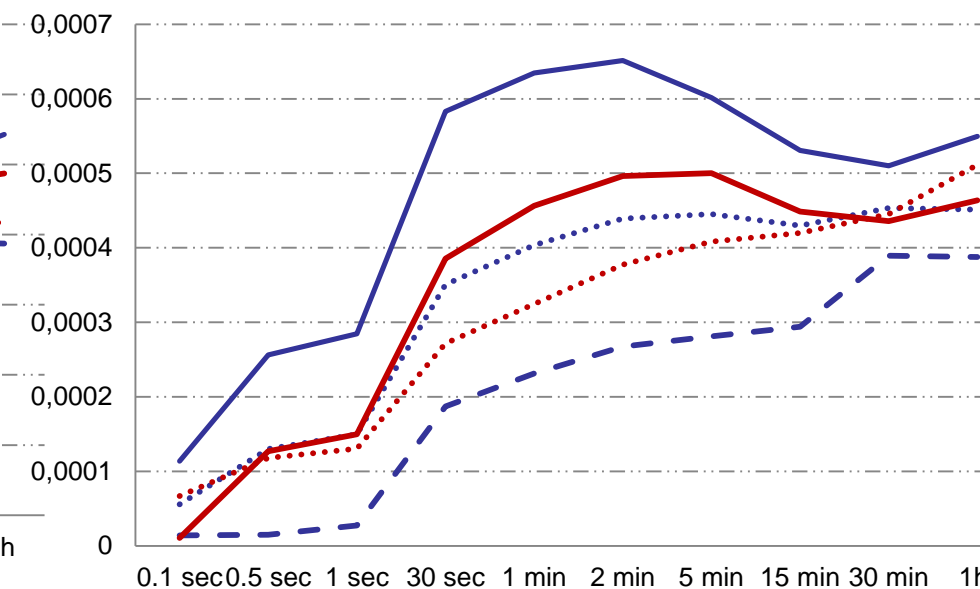- fast MO principal
- fast MO others

Speed Capacity = 1300
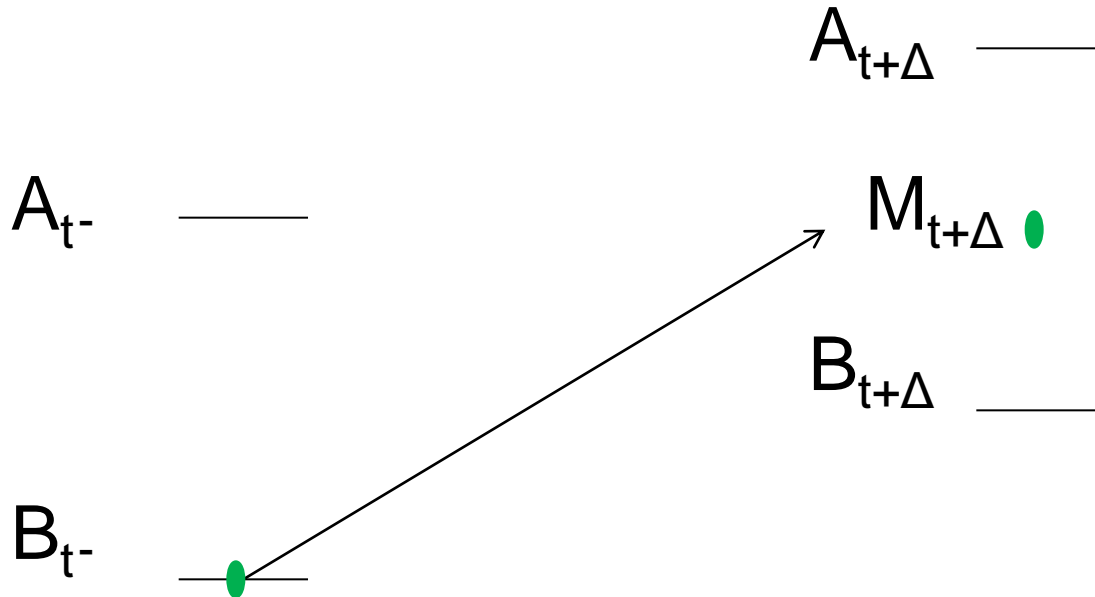
Speed Capacity = 1600

Speed Capacity = 2400

Liquidity suppliers' profits

Are they buying (resp. selling) at price below (resp. above) expected value (proxied by later midquote)?

$A_{t+\Delta}$ ———

A_{t-} ———

$M_{t+\Delta}$

$B_{t+\Delta}$ ———

B_{t-}

Which types of players provide liquidity more profitably? Fast ? Slow? Principal?

Does profit measure vary with horizon? 1 second? 1 minute? 1 hour?

Measuring limit order profits

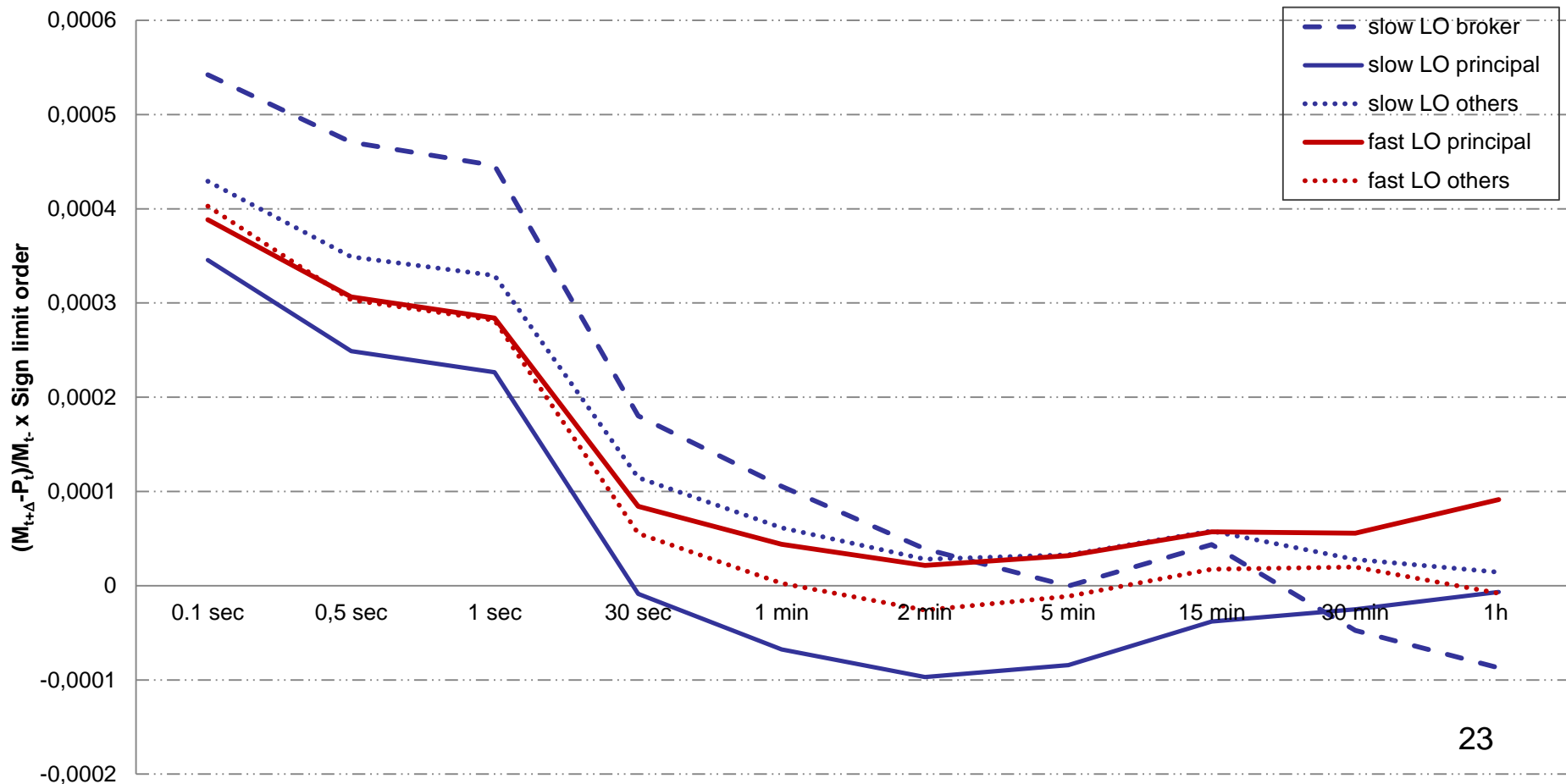$(M_{t+\Delta} - P_t)$ * sign of limit order (>0 if limit order to buy)

Empirical average for 5 different categories of LO traders

Regression on dummy for type of trade + control variables
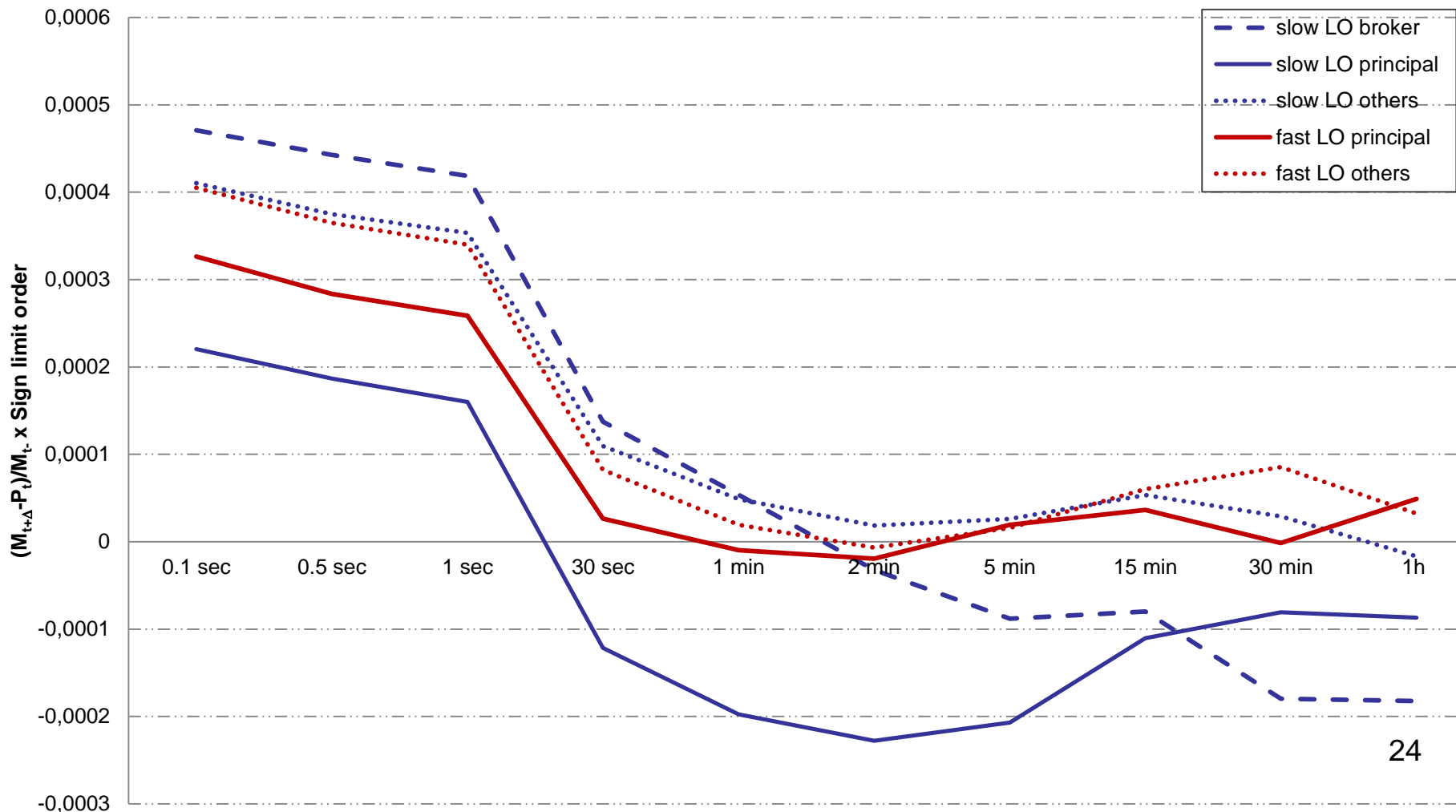
Similar results

Profits close to 0 at horizon ≥ 1 minute
Competive liquidity supply (Glosten 1993)?
Fast limit orders slightly more profitable ≥ 5 minutes

Empirical average, whole sample

23

Midst of Crisis:
Larger losses for limit orders, especially slow (consistent with increased adverse selection)

Empirical average, May June 2010

Do fast limit order cope better with adverse selection?

If so, fast liquidity suppliers have competitive edge over slow liquidity suppliers
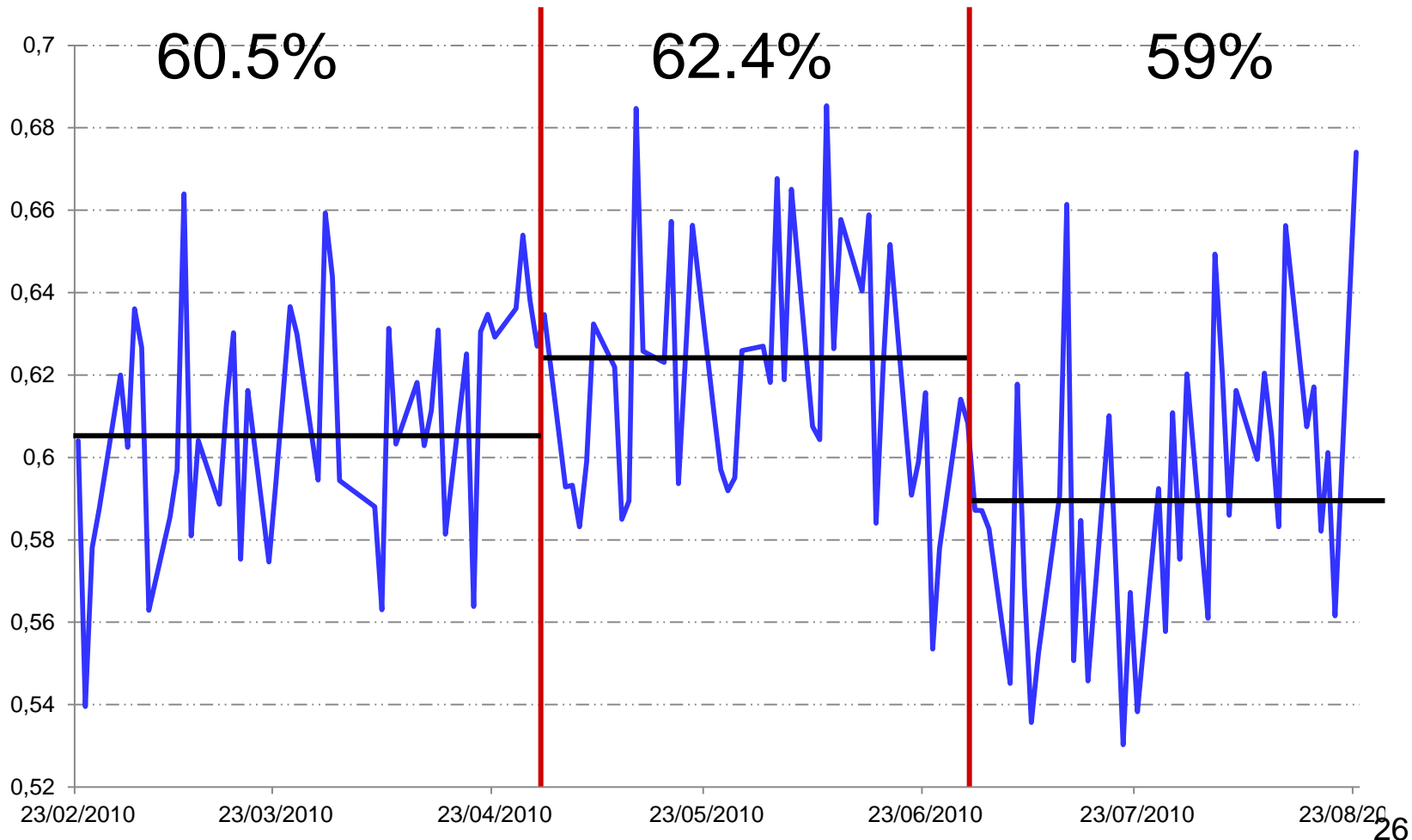
=> Share of liquidity provision by fast traders increases when adverse selection increases

Compare:

$$\frac{\text{Total number of fast limit orders executed}}{\text{Total number of limit orders executed}}$$

out of the crisis and during the crisis

% of executed limit orders that are fast larger during crisis

60.5%   62.4%   59%

Conclusion

Prop traders most informed (market orders with highest info content) & most aggressive (rely most on market orders) => adverse selection for others

Slow prop more informed than fast, except during crisis

Crisis: more adverse selection/losses for limit orders

Limit orders profits close to 0: competitive liquidity supply (Glosten 1993)?

Fast limit orders more profitable than slow

Fast = larger fraction of liquidity supply during crisis

Fast limit orders cope better with adverse selection?